

# Materials Tip



## Materials Engineering Branch

Minimizing Stray Magnetic Fields Through Materials Selection*			
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Using magnetic materials, components, and wiring layout that can generate magnetic fields must be minimized in constructing space flight hardware. Proper design and choice of manufacturing techniques can greatly reduce or eliminate stray magnetic fields.

### General

- Keep electronic component lead lengths as short as possible.
- Avoid wiring loops and multiple ground paths.
- Use shielded wire or twisted pairs.

To reduce magnetic fields, avoid using ferro-magnetic materials for parts and structure whenever possible. The following is a categorized list of some commonly used structural and electronic materials:

### NON-MAGNETIC

Aluminum  
Alloy 30, 60, 90  
Alloy 180  
Beryllium  
Beryllium Copper  
Brass  
Copper  
Carboloy  
Germanium  
Gold  
Lead  
Magnesium Alloy  
Manganin  
Molybdenum  
Neutroloy  
Nickel Silver

### NON-MAGNETIC

Tantalum  
Titanium  
Tungsten  
Zirconium

### FEEBLY MAGNETIC

Stainless Steel  
202 & 300 Series  
K-Monel  
Alloy 720

### MAGNETIC

Cobalt  
Copperweld  
Dumet

Ferrites  
Gridaloy M,P  
Iron  
Invar  
Kovar  
Mesoloy  
Molypermalloy  
Mumetal  
Nichrome  
Nickel, 200, 270  
Nickel Iron  
Platinum  
Pelcoloy  
Permalloy  
R Monel  
Remendur  
Rodar  
Silicone Steel

Phosphor Bronze  
Protoloy  
Silver

Electroloy  
Elinvar  
Fenicoloy

Stainless Steel 400 Series  
Superalloy  
Vicalloy

\*Material excerpted from NASA Report X-325-67-70 "Magnetic Field Restraints for Spacecraft Systems and Subsystems" by Charles Harris